REMARKS

Examiner Jeff B. Vockrodt is thanked for thoroughly reviewing the instant application and for examining the Prior Art.

Examiner is also thanked for the indication of allowing claims 13-32 if these claims are rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claims 8-32 are pending under this Office Action.

The following action has been taken relative to the claims of the invention:

- Claims 9-12 have been cancelled
- Claim 13 has been rewritten in independent form by including claim 13 in claim 8, claim 13 has been cancelled, claims 14-16 have been amended to being dependent claims to the new base claim 8
- Claim 17 has been rewritten in independent form by including claim 17 into the original base claim 8 and by thereby forming a new independent claim 38, claim 17 has been cancelled, claims 18-23 have been amended to being dependent claims to the new claim 38

- Claim 24 has been rewritten in independent form by including claim 24 into the original base claim 8 and by thereby forming a new independent claim 39, claim 24 has been cancelled, claims 25-28 have been amended to being dependent claims to the new claim 39, and
- Claim 29 has been rewritten in independent form by including claim 29 into the original base claim 8 and by thereby forming a new independent claim 40, claim 29 has been cancelled, claims 30-32 have been amended to being dependent claims to the new claim 40.

No new matter has been introduced as a consequence of the above highlighted amendments provided to the claims of the invention.

Favorable reconsideration of this application in light of the above amendments and the following remarks is respectfully requested.

The invention provides five new methods for the formation of an improved liquid-crystal-on-silicon display. The device structure is enhanced by the photolithographic creation of alignment posts among the mirror pixels of the micro-display.

The five methods accommodate the fabrication of an optical interference multilayer, which improves the image quality of the reflected light. The five methods of the invention provide:

- silicon dioxide posts by wet etching
- amorphous silicon posts by plasma etching
- silicon nitride posts by plug filling
- insulation material posts by lift-off, and
- polyimide posts by photosensitive etching.

Claim rejections - 35 U.S.C. § 103(a)

1. Reconsideration of the rejection of claim 8 under 35 U.S.C 103(a) as being unpatentable over Wong (US 6,027,999) in view of Moore (US Patent 6,124,912) is respectfully requested based on the following.

Claim 8 has been amended by including the allowable claim 13 into claim 8, creating a new base claim that is now in allowable form.

In light of the foregoing response, applicant respectfully requests that the Examiner's rejection of claim 8 under 35 U.S.C

103(a) as being unpatentable over Wong (US 6,027,999) in view of Moore (US Patent 6,124,912), be withdrawn.

2. Reconsideration of the rejection of claims 9-12 under 35 U.S.C 103(a) as being unpatentable over Wong (US 6,027,999) in view of Moore (US Patent 6,124,912) as applied to claim 8 above, further in view of Colgan (US Patent 5,831,710) is respectfully requested based on the following.

The rejection is considered moot because the claims have been cancelled.

In light of the foregoing response, applicant respectfully requests that the Examiner's rejection of claims 9-12 under 35 U.S.C 103(a) as being unpatentable over Wong (US 6,027,999) in view of Moore (US Patent 6,124,912) as applied to claim 8 above, further in view of Colgan (US Patent 5,831,710), be withdrawn.

Other Considerations

New independent claims 38-40 have been written as a result of this office action, no new dependent claims have been written as a result of this office action.

SUMMARY

The invention provides five new methods for the formation of an improved liquid-crystal-on-silicon display. The device structure is enhanced by the photolithographic creation of alignment posts among the mirror pixels of the micro-display. The five methods accommodate the fabrication of an optical interference multilayer, which improves the image quality of the reflected light. The five methods of the invention provide:

- silicon dioxide posts by wet etching
- amorphous silicon posts by plasma etching
- silicon nitride posts by plug filling
- insulation material posts by lift-off, and
- polyimide posts by photosensitive etching.

It is requested that should Examiner not find the claims to be allowable that he call the undersigned Attorney at his convenience at 845-452-5863 to overcome any problems preventing allowance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned:

"Version with markings to show changes made."

Respectfully submitted,

Stephen B. Ackerman (Reg. No 37,761)

Version with markings to show changes made

Please amend the claims as follows

8. (Twice Amended) A method of forming a device structure that combines insulating materials for alignments posts and optical interference layers associated with an active device structure in a silicon body comprising:

providing a silicon wafer having a pattern of active device structures therein and thereon;

forming a first metallic layer over the surface of said wafer;

forming a second metallic layer over said first metallic layer, which is used both for connections and for bonding pads;

forming a silicon dioxide insulation over said second metallic layer;

forming a third metallic layer over said layer of silicon dioxide;

forming a photoresist mask over said third metallic layer having a covering over planned pixel locations of said liquid-crystal-on-silicon display device;

removing said third metallic layer not covered by said photoresist mask, forming said alignment posts whereby said alignment post are formed by the process of amorphous silicon by plasma etching upon said silicon substrate;

removing said photoresist mask to provide that each said pixel retains said third metallic layer, which shall act as a mirror reflector for light incident upon said liquid-crystal-on-silicon display device; and

depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride over said third metallic layer and said silicon dioxide layer.

9. Please cancel claim 9.

10. Please cancel claim 10.

11. Please cancel claim 11.

12. Please cancel claim 12.

13. Please cancel claim 13.

14. (Amended) The method of claim [13] 8 for forming an amorphous silicon layer of thickness between about 0.1 and 5 microns to achieve the desired height of the alignment posts.

15. (Twice Amended) The method of claim [13] 8 for forming a photoresist mask over said amorphous silicon layer to cover the location of each planned alignment post.

16. (Twice Amended) The method of claim [13] 8 for removing said amorphous silicon to form said alignment posts by plasma etch, and removing said photoresist mask.

17. Please cancel claim 17.

18. (Amended) The method of claim [17] 38 for forming a PECVD oxide layer of thickness between 0. 1 and 5 microns to achieve the desired height of the alignment posts.

19. (Twice Amended) The method of claim [17] 38 for forming a photoresist mask over said PECVD oxide layer to expose the location of each planned alignment post.

20. (Twice Amended) The method of claim [17] 38 for forming post cavities by plasma etching of said PECVD oxide layer.

21. (Twice Amended) The method of claim [17] 38 for plasma enhanced chemical vapor deposition of silicon nitride into said post cavities.

22. (Thrice Amended) The method of claim [17] 38 for etch-back removal of said silicon nitride, except that silicon nitride deposited in said post cavities.

23. (Twice Amended) The method of claim [17] 38 for removing the PECVD oxide layer by wet etch (such as HF or buffered HF) to form said silicon nitride alignment posts, and removing said photoresist mask.

24. Please cancel claim 24.

25. (Amended) The method of claim [24] 39 wherein a photoresist or PMMA acylic layer of thickness between about 1 and 5 microns is deposited upon the OIL and covered by silicon monoxide via thermal evaporation, followed by another photoresist layer of thickness between about 0.1 and 1 micron.

26. (Twice Amended) The method of claim [24] 39 wherein a photomask is used to form said cavities in said silicon monoxide by a CF4 plasma etching of the silicon monoxide, after which the

silicon monoxide serves as a mask for an oxygen plasma etching of said two-micron bottom photoresist.

27. (Amended) The method of claim [24] 39 for forming an insulation material by plug filling the cavities formed in the silicon monoxide and two-micron bottom photoresist layer; several insulation materials are available from which to choose, including calcium fluoride, silicon monoxide, yttrium oxide, and aluminum oxide, and the like.

28. (Twice Amended) The method of claim [24] 39 for removing said bottom photoresist layer by lift-off with an ultrasonic bath, leaving said alignment posts.

29. Please cancel claim 29.

30. (Amended) The method of claim [29] 40 for forming a photosensitive polyimide layer of thickness between about 0.1 and 5 microns posts to achieve the desired height of the alignment posts.

31. (Twice Amended) The method of claim [29] 40 for exposing said photosensitive polyimide at the location of each planned alignment post.

32. (Twice Amended) The method of claim [29] 40 for developing and removing said photosensitive polyimide to leave said alignment posts in the location of the exposed polyimide described herein, and removing said photoresist mask.

Please enter the following new claims:

38. A method of forming a device structure that combines insulating materials for alignments posts and optical interference layers associated with an active device structure in a silicon body comprising:

providing a silicon wafer having a pattern of active device structures therein and thereon;

forming a first metallic layer over the surface of said wafer;

forming a second metallic layer over said first metallic layer, which is used both for connections and for bonding pads;

forming a silicon dioxide insulation over said second metallic layer;

forming a third metallic layer over said layer of silicon dioxide;

forming a photoresist mask over said third metallic

layer having a covering over planned pixel locations of said liquid-crystal-on-silicon display device;

removing said third metallic layer not covered by said photoresist mask, forming said alignment posts by the process of silicon nitride by plug filling upon the silicon substrate;

removing said photoresist mask to provide that each said pixel retains said third metallic layer, which shall act as a mirror reflector for light incident upon said liquid-crystal-on-silicon display device; and

depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride over said third metallic layer and said silicon dioxide layer.

39. A method of forming a device structure that combines insulating materials for alignments posts and optical interference layers associated with an active device structure in a silicon body comprising:

providing a silicon wafer having a pattern of active device structures therein and thereon;

forming a first metallic layer over the surface of said wafer;

forming a second metallic layer over said first metallic layer, which is used both for connections and for bonding pads;

forming a silicon dioxide insulation over said second metallic layer;

forming a third metallic layer over said layer of silicon dioxide;

forming a photoresist mask over said third metallic layer having a covering over planned pixel locations of said liquid-crystal-on-silicon display device;

removing said third metallic layer not covered by said photoresist mask, forming said alignment post by the process of insulation material by lift-off upon said optical interference layer OIL;

removing said photoresist mask to provide that each said pixel retains said third metallic layer, which shall act as a mirror reflector for light incident upon said liquid-crystal-on-silicon display device; and

depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride over said third metallic layer and said silicon dioxide layer.

40. A method of forming a device structure that combines insulating materials for alignments posts and optical interference layers associated with an active device structure in a silicon body comprising:

providing a silicon wafer having a pattern of active device structures therein and thereon;

forming a first metallic layer over the surface of said wafer;

forming a second metallic layer over said first metallic layer, which is used both for connections and for bonding pads;

forming a silicon dioxide insulation over said second metallic layer;

forming a third metallic layer over said layer of silicon dioxide;

forming a photoresist mask over said third metallic layer having a covering over planned pixel locations of said liquid-crystal-on-silicon display device;

removing said third metallic layer not covered by said photoresist mask, forming said alignment post by a process of polyimide by photosensitive etching upon an Optical Interference Layer (OIL);

removing said photoresist mask to provide that each said pixel retains said third metallic layer, which shall act as a mirror reflector for light incident upon said liquid-crystal-on-silicon display device; and

depositing optical interference layers of silicon oxide or silicon nitride or silicon oxide or silicon nitride over said third metallic layer and said silicon dioxide layer.